North and Middle Forks

John Day River

Agricultural Water Quality Management Area Plan

Guidance Document

Developed by

The North and Middle Forks John Day River
Local Advisory Committee

with assistance from

Oregon Department of Agriculture
and
Monument Soil and Water Conservation District

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ACRONYMS

AF	Acre Feet
AgWQM	Agricultural Water Quality Management
Area Plan	Agricultural Water Quality Management Area Plan
Area Rules	Agricultural Water Quality Management Area Rules
BLM	Bureau of Land Management
CAFO	Confined Animal Feeding Operation
cfs	Cubic feet per second
CREP	Conservation Reserve Enhancement Program
CWA	Clean Water Act
DEQ	Department of Environmental Quality
DOGAMI	Oregon Department of Geology and Mineral Industries
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentive Program
ESA	Endangered Species Act
LA	Load Allocation
LAC	Local Advisory Committee
LMA	Local Management Agency
NRCS	Natural Resources Conservation Service
OACD	Oregon Association of Conservation Districts
OAR	Oregon Administrative Rule
OCA	Oregon Cattleman's Association
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
ORS	Oregon Revised Statute
OSU	Oregon State University
OWEB	Oregon Watershed Enhancement Board
RM	River Mile
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load
USDA	US Department of Agriculture
USFS	US Forest Service
WRD	Water Resources Department

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Agricultural Water Quality Management Area Plan
North and Middle Forks John Day River

FOREWORD

This Agricultural Water Quality Management (AgWQM) Area Plan (Area Plan) provides guidance for addressing agricultural water quality issues in the North and Middle Forks John Day River AgWQMArea. The purpose of this Area Plan is to identify strategies to reduce water pollution from agricultural lands through a combination of educational programs, suggested land treatments, management activities, and monitoring.

The provisions of this Area Plan do not establish legal requirements or prohibitions.

The Oregon Department of Agriculture (ODA) will exercise its enforcement authority for the prevention and control of water pollution from agricultural activities under administrative rules for the North and Middle Forks John Day River AgWQMArea (Oregon Administrative Rules (OAR) 603-095-1000 through OAR 603-095-1060), see Attachment 3, and state wide enforcement procedures provided in OAR 603-090-0060 through OAR 603-090-0120.

This Area Plan will be used by the local management agencies for guiding their implementation, outreach, and assistance efforts and by landowners to enhance their awareness and understanding of water quality issues.

INTRODUCTION

The 1993 Oregon Legislature, through passage of Senate Bill 1010 (ORS 568.900 - 568.933), designated the ODA to be the lead state agency working with agriculture to address water pollution. Oregon adopted the law to give agriculture an effective way to meet the requirements of federal and state clean water regulation. Through SB 1010, ODA is authorized to develop and carry out a water quality management plan for agricultural or rural lands, whenever a water quality management plan is required by state or federal law. In the 2001 legislative session, ORS 568.900–933 was amended to clarify that only the Area Rules associated with an Area Plan are enforceable, not the plan itself.

In 1995, the Oregon Legislature passed SB 502 (ORS 561.191) that stipulates that ODA shall develop and implement any program or rules that directly regulate farming practices that are for the purpose of protecting water quality and that are applicable to areas of the state designated as exclusive farm use zones or other agricultural lands. The implications of the legislation are that

in Oregon, ODA is the state agency responsible for regulating agricultural activities that affect water quality.

Recent legislation has also clarified that ODA entry onto private property must be consistent with section 9, Article I of the Oregon Constitution, and the Fourth Amendment of the United States Constitution; that ODA may not impose a civil penalty on a landowner for a first violation of any water quality rules unless certain conditions are met; and that any new fees proposed by ODA are subject to legislative approval.

Oregon's agricultural pollution management program requires area plans to help identify and control water pollution caused by activities on agricultural and rural lands. These plans recognize that the best way to prevent or control pollution from agricultural and rural land is to work to reduce the conditions on that land that cause pollution.

This area plan was developed by volunteer members of the North and Middle Forks John Day River AgWQMArea Local Advisory Committee (LAC) and the ODA, with assistance from the Monument Soil and Water Conservation District (SWCD). It represents the efforts of the LAC, ODA and the SWCD in consultation with members of the community to address water quality as it may be affected by conditions on agricultural and rural land in the planning area.

The operational boundaries of this Area Plan include all private agricultural and rural land that drains into the North and Middle Forks of the John Day River and their tributaries. Federally managed land and those activities subject to the Oregon Forest Practices Act are exempted from this Area Plan but are subject to Water Quality Management Plans developed by their respective designated management agencies. This Area Plan applies to agricultural lands in current use and those lying idle or on which management has been deferred. This Area Plan applies also to rural lands not in agricultural use such as private roadways and rural residential properties.

GEOGRAPHIC AREA AND PHYSICAL SETTING

The John Day River Basin is an 8100 square mile drainage area, the 4th largest basin in the state. The flows originate in the Blue Mountains and flow generally westward and then northward for approximately 284 miles, discharging into the Columbia River east of Rufus, at River Mile (RM) 218. The John Day River is one of the longest rivers without a dam in the United States. The climate is continental, characterized by low winter and high summer temperatures, low average annual precipitation and dry summers. Precipitation ranges from 9 inches at the mouth to over 40 in the upper reaches.

The North Fork subbasin is an area of 1800 square miles that flows westward for over 100 miles, entering the John Day River mainstem at Kimberly (RM 184.2). The subbasin includes parts of Grant, Umatilla, Morrow, Union, and Wheeler Counties. The elevation ranges from 1830 feet at the mouth to over 8300 feet in the Blue Mountains. The climate varies from semi-arid near the mouth to relatively moist at higher elevations. Precipitation ranges from slightly more than 13

inches at Monument to over 40 inches annually (mostly snow) at the higher elevations of the Blue Mountains.

The Middle Fork subbasin, a tributary to the North Fork, drains 806 square miles and flows approximately 75 miles joining the North Fork at RM 32.2, above Monument. The subbasin is entirely in Grant County. The elevation ranges from 2200 feet at the mouth to over 8100 feet in the headwaters.

Most of the North and Middle Forks subbasins are in the John Day Ecological Province which consists of "extensive areas of steeply and intricately dissected hills interspersed with isolated buttes and extensive plateaus and large and small valleys. The hills are mainly geologically eroded ancient lacustrine materials; plateaus and buttes are capped with igneous or tuffaceous rock. Soils are directly related to these different geologic formations; they are the parent materials in which the soils have formed." The upper North Fork is in the Blue Mountain Province "typified by groups of rugged mountains, steep canyons and extensive plateaus divided by dendritic-pattern drainages. Basalt is the major bedrock underlying mountains and plateaus. Soils can be grouped according to natural vegetation." (*The Ecological Provinces of Oregon, 1998)*

Water Yield

The North Fork, including the Middle Fork, yields about 60% of the annual discharge of the John Day River basin. The flow comes mostly from melting snowpack with late summer flows from groundwater. Average annual discharge at Monument, measured since 1925, is 904,200 acre-feet (AF). Peak discharge occurs between March and early June and the lowest flows generally occur during July, August, and September. The Middle Fork contributes about 25% of the North Fork flow with average annual measured flow at Ritter of 168,464 AF and an average annual estimated discharge at the mouth of about 268,000 AF.

Land Use

Forest covers 73% of the land area; range & pasture 24%; cropland 2%; and other uses 1%. Ninety-five percent of the land is used for grazing. In 1985, about 40% of the cropland was irrigated. Mining claims form small private enclaves mostly within federally managed land.

Urban areas occupy only a small portion of the North and Middle Forks subbasins. Long Creek, Monument, Ukiah and Granite are the incorporated cities with a total population of 690.

Special management areas include: the North Fork John Day River Wilderness (122,000 A.), the federal Wild and Scenic River System (27.8 miles - Wild River, 10.5 miles - Scenic River, 15.8 miles - Recreational River), State Scenic Waterways (53 miles - Accessible Natural River, 3 miles - Recreational River, 11 miles - Natural River, 60 miles - Scenic River), US Forest Service (USFS) Greenhorn Mountains Scenic Area (29,285 A.) and Oregon Department of Fish and Wildlife (ODFW) Bridge Creek Wildlife Management Area (12,800 A.).

Significant mining has taken place in several areas of the basin. Gold was discovered in the Canyon City area in 1862, which led to further exploration and settlement in the area. Large deposits were found in the Susanville and Greenhorn areas of the North and Middle Forks subbasins. Hydraulic mining was used to wash soil and gravel away to expose the gold ore. Dredges were used in the streams to dig up the deposited gravel and sift out the gold. The Oregon Department of Geology and Mineral Industries (DOGAMI) estimates that at least 13 million cubic yards of material was handled on the North Fork-Granite Creek-Clear Creek system and 4.2 million cubic yards on the Middle Fork-Vincent Creek systems.

Land Ownership

Most of the land (65%) in the subbasin is owned by the public; managed by the USFS and USDI-Bureau of Land Management (BLM). The USFS lands are primarily in the eastern and northern headwaters areas and BLM lands are scattered throughout the western part of the basin and along the stream corridors. Private ownership occurs in the lower elevations, along streams and intermediate uplands. The State of Oregon owns scattered tracts throughout the basin totalling about 15,000 acres, which includes the Bridge Creek Management Area.

Agriculture

Agriculture is the primary private sector economic activity in the John Day Basin. The primary agricultural products in the AgWQM Area are alfalfa, meadow hay and beef cattle. Most hay produced is used to feed wintering cattle. Cattle production comprises over 70% of the agricultural income. Range forage provides over 50% of the year-round cattle feed with hay and pasture providing the remainder. Approximately half of the cattle operations use BLM or USFS range on a permit basis.

The North Fork subbasin has about 24,000 acres of cropland, evenly split between irrigated and non-irrigated. Major crops are grain hay, meadow hay and pasture. Other crops include, alfalfa, orchards, and mint. The Middle Fork subbasin has about 10,600 acres of cropland, one-third irrigated. Crops include alfalfa, meadow and grass hay, pasture, grain, and grain hay.

Income from forestry and forest products ranks second to agriculture in the private sector economy of the John Day basin. However, due to forest health and declining availability of federal timber, forest revenues have dropped dramatically in recent years.

Grant County agricultural commodity sales for all crops and livestock (including woodlot products) for 1998 was $20,703,000. Since 1988, gross farm sales have ranged from about $16 to $23 million. Current statistics show that there are 50,600 cows and calves and 700 sheep and lambs, 39,000 acres of hay, 450 acres of grain and field crops, and 181 acres of orchards in Grant County. Products from woodlots made up $4,582,000 or nearly 25% of the commodity sales. (Oregon State University (OSU) Extension Economic Information Office, 1999)

Early stockmen raised cattle and horses. In the 1880's many cattle herds were sold and replaced with sheep. Grant County excelled in the production of wool. The 1893 assessment records

show 17,631 cattle and 158,355 sheep. Sheep numbers began dropping off in the 1930's with an increase in cattle. Farming began in the 1860's with a gradual conversion of some stock ranches to farming in the valleys.

Water Use

The North Fork subbasin has water rights, administered by the Oregon Water Resource Department (WRD), for 536.0 cubic feet per second (cfs), mainly for irrigation (291.5 cfs) and mining (202.2 cfs). Annually, a total of 13,400 acres are irrigated, mostly by sprinklers, requiring 17,800 AF of water. Minimum streamflows were established in 1962 at Monument (55 cfs) and Dale (30 cfs). Some water may be diverted from the North Fork to the Umatilla basin (25-28 cfs) and the NF Burnt River (22 cfs) for irrigation. There are currently 15 instream water rights.

The Middle Fork subbasin has water rights for 146.7 cfs for irrigation (88.5 cfs) and mining (49.5 cfs). Mining rights are mostly junior, dated later than 1970. Irrigation is mostly flood near Long Creek and above Galena and totals 4900 acres. Approximately 5100 AF (44 cfs) is required from May to September. Minimum streamflows were established in 1962 for 10 cfs at Ritter for support of aquatic life. There are currently seven instream water rights.

Instream water rights are approved by WRD for fish protection, minimizing the effects of pollution or maintaining recreational uses. Instream water rights have a priority date and are regulated in the same way as other water rights. An instream water right cannot affect a use with a senior priority date. As of the date of publication, seven instream water rights applications are pending, two in the North Fork and five in the Middle Fork.

There are no major impoundments in the John Day basin. Over the years, many reservoir sites have been identified in both subbasins for upstream storage of water. All of these sites are considered to have a potential adverse impact on anadromous fish runs. None of the sites was found to be justifiable economically, under the criteria used by federal agencies at that time.

Applications have been made to WRD for reservation of water in the North and Middle Forks subbasins for use in supplying irrigation uses or to meet adopted minimum perennial streamflow levels to be reserved for future appropriations. The decisions to approve the reservations are still pending.

Fishery Resources

The North and Middle Fork subbasins are the major producers of wild spring chinook and summer steelhead for the John Day Basin. The North Fork produces 58% of the spring chinook on 72 miles of spawning and rearing habitat, and 43% of the total summer steelhead on 700 miles of habitat. The Middle Fork produces 24% of the total spring chinook on 30 miles of spawning and rearing habitat and 30% of the summer steelhead on 295 miles of habitat. Bull trout, a threatened species, is also present in the upper reaches as well as widespread populations of resident trout throughout the basin. Warm water species, including small mouth bass, exist in

the lower mainstem reaches. Trends show a general increase in spawning density for spring chinook but show serious declines for summer steelhead, which has warranted a threatened listing under the federal Endangered Species Act (ESA).

The life histories of chinook and steelhead differ in the time that they use the river. Chinook enter the John Day River during April through June, hold in deep pools throughout the summer and spawn in late August and September in the upper reaches of the mainstem and lower reaches of primary tributaries. Juveniles spend about one year in fresh water before they "smolt," or migrate to the ocean. Steelhead enter the river in late August and September, spawn from March though June, and spend one to three years rearing in a much larger part of the basin. Smolt migration for both species takes place from February through May.

Natural ocean conditions and recent drought conditions have been contributing factors for recent declines of anadromous species. Habitat throughout the basin has been improving in some locations because of numerous fencing and habitat restoration projects, improvements to irrigation diversions and improved grazing management on both private and public lands.

WATER QUALITY ISSUES

The North Fork subbasin produces the best quality water, chemically, physically and biologically, in the John Day basin (John Day River Basin Report, November 1986). Water distribution is a problem with high winter flows and low summer flows. High flows can carry sediment and can cause localized erosion and sedimentation while low flows along with lack of vegetation and other factors can result in high water temperatures. There are numerous sites with hot water (geothermal) springs, but total flows or the impact to stream temperatures are not fully understood.

Beneficial Uses

Water quality in the John Day River basin must be managed to protect recognized beneficial uses. Beneficial uses of water in the John Day basin are public and private water supply, industrial water supply, irrigation, livestock watering, anadromous fish passage, salmonid fish rearing and spawning, resident fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, and aesthetic quality. Beneficial uses that are adversely affected, according to current data, include: salmonid fish rearing and spawning, and resident fish and aquatic life.

Water Resources Department (WRD) Rules (OAR 690-506-0010, John Day Basin Program) recognizes important economic, social, and environmental benefits to the public including: increases in crop production, enhancement of wild anadromous and resident fish production, provision of adequate water supplies for livestock and wildlife, enhancement of water-related tourism and recreation opportunities, maintenance of adequate water quality and quantity for projected domestic, industrial and municipal growth, and development of storage reservoirs that are beneficial to anadromous fish and other uses.

Water Quality Parameters of Concern

The Federal Clean Water Act (CWA), through the Environmental Protection Agency (EPA), requires each state to identify beneficial uses for each waterbody, to designate parameters to monitor for each beneficial use and to establish a standard or criteria for each parameter.

Section 303(d) of the CWA requires each state to develop a list of waterbodies that do not meet the standards designed to protect the most sensitive beneficial use and to report findings to Congress every two years. Approximately 75 river or stream segments in the AgWQM Area have been declared water quality limited by the Oregon Department of Environmental Quality (DEQ), in 1998, under section 303(d).

The Middle Fork subbasin contains 23 streams or stream segments that do not meet the standards for temperature and one that does not meet the flow modification standard. The North Fork subbasin contains 34 streams or stream segments that do not meet the habitat modification standard, 9 that do not meet the sedimentation standard, 38 that do not meet the temperature standard and 2 that do not meet the biological criteria standard. See Attachment 1 for the complete list of streams and parameters of concern.

Water quality standards for the John Day Basin, (Oregon DEQ OARs 340-041- 605) state: (1) Notwithstanding the water quality standard contained below, the highest and best practicable treatment and/or control of wastes, activities, and flows shall in every case be provided so as to maintain dissolved oxygen and overall water quality at the highest possible levels and water temperatures, coliform bacteria concentrations, dissolved chemical substances, toxic material, radioactivity, turbidity, color, odor, and other deleterious factors at the lowest possible levels. (2) No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause violation of the following standards in the waters of the John Day basin."

Of the beneficial uses of water in the John Day River basin, the most sensitive use for most waters and parameters of concern is spawning and rearing of cold-water fisheries. The following discussion of water quality parameters of concern in the watershed addresses the CWA requirements for standards to be established for the most sensitive beneficial use.

Temperature

Water temperature is primarily a summer concern, a season characterized by low flow and high air temperature, for rearing of anadromous fish species, resident trout and Bull trout. Water temperatures above 70°F can be immediately lethal to salmonids due to a breakdown in their respiration and circulation systems. Temperatures between the mid 60's°F to 70°F are stressful to salmonids, and fish survival is reduced as the salmonids are more susceptible to a variety of other agents. The sub-lethal effects associated with higher than optimum temperatures are disease, reduced metabolic energy for feeding, and reduced growth or reproductive behaviour due to avoidance of areas with high temperatures.

Current DEQ standards state that no measurable surface water temperature increase resulting from anthropogenic (man-caused) activities is allowed:

- in a basin for which salmonid fish rearing is a designated beneficial use, and in which surface water temperatures exceed 64.0° F.
- in waters and periods of the year supporting native salmonid spawning, egg incubation, and fry emergence from the egg and from gravels, which exceeds 55.0° F.
- in waters supporting native bull trout, when surface water temperature exceed 50.0°F.

Determining whether the stream temperature is above or below the temperature standard is based on the average of the maximum daily water temperatures for the stream's warmest, consecutive seven-day period during the year. Water temperature measurements must be taken with continuous recording temperature sensors, in well-mixed and representative locations of streams.

A one-time measurement above the standard will NOT be considered a violation of the standard. When stream flow is exceptionally low or air temperature is exceptionally high the temperature criteria are waived (an example is when the flow is less than the expected ten year low flow or the air temperature is above the 90_{th} percentile of a seven day average).

Flow Modification

Activities including water withdrawal can reduce the amount of water available for aquatic habitat, especially in spawning and rearing areas. Fish migration patterns can also be affected. Reduced amounts of water in the stream channel can contribute to increased stream temperatures. Streamflow reduction may also affect riparian vegetation growth that provides multiple contributions to improving and maintaining water quality.

Streams are listed as violating this standard if all four of the following conditions are found:

- In-stream water rights exist or are applied for
- These flows are frequently not being met
- There is identification of human contribution to reduction of instream flows
- There is evidence of aquatic community impairment (see Biological Criteria below)

Sedimentation

Sediment above natural levels affects drinking water for humans and impacts salmonid reproduction and rearing. The formation of appreciable deposits of sediment interferes with the quality of gravels in the streambed that are essential for successful spawning, incubation and rearing of salmonids.

Habitat Modification

Habitat modification can drastically reduce the amount of instream habitat available for the life cycle of aquatic life. Habitat can be influenced by land management or by natural events.

Biological Criteria

Biological criteria refer to the support of plants and animals that live at least part of their life cycle in water. Factors that affect biological criteria are stream disturbances, excessive heat inputs and excessive sediment. Waters of the state must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities. (OAR 340-41-027)

Sources of Water Quality Impairment

Sources of water pollution can be generalized into two types: point source pollution and nonpoint source pollution. Point source pollution emanates from clearly identifiable discharge points such as wastewater treatment plants, piped effluent from industrial operations and other discrete conveyances. Permits are required for significant point source discharges. These permits, administered by DEQ require that certain effluent standards be met or require a zero discharge level. Certain Confined Animal Feeding Operations (CAFO) require permits which are administered by ODA.

Nonpoint source pollution is pollution emanating from landscape scale sources and cannot be traced to a single point. Probable nonpoint sources of pollution in the John Day River watershed include eroding agricultural and forest lands, eroding streambanks, runoff and erosion from roads and urban areas, and runoff from livestock and other agricultural operations. Pollutants from nonpoint sources are carried to the surface water or groundwater through the action of rainfall, snowmelt, irrigation and urban runoff, and seepage.

A major nonpoint source of water quality impairment is heat input that results in high water temperatures. Water temperature naturally fluctuates with air and soil temperatures on a daily and seasonal basis, however, temperature increases may be caused by both natural and man-caused events resulting in vegetation removal, low seasonal flows, changes in channel shape and alteration to the floodplain. Channelization or alteration of stream courses can alter gradient, width/depth ratio and sinuosity, causing sediment and temperature increases.

While there may not be severe impacts on water quality from a single source or activity, the combined effects from all sources contribute, along with impacts from other land uses and activities, to the impairment of beneficial uses of the John Day River.

STRATEGIES FOR ACHIEVING PLAN GOALS, AND OBJECTIVES

The ODA's and the SWCD's primary strategies to reduce amounts of pollution from agricultural and rural lands lie in the reduction of pollutants in runoff and the reduction of erosion through a combination of educational programs, land treatment, implementation of sound management practices, installation of erosion control structures, and monitoring of implementation effectiveness. A secondary strategy is to adopt and ensure compliance with Prevention and Control Measures directly related to water quality.

To achieve clean water an effective strategy must increase awareness of the problems and the range of potential solutions, motivate appropriate voluntary action, and provide for technical and financial assistance to plan and implement effective conservation practices. The following objectives will be employed at the local level by Monument, Grant, and Umatilla County SWCDs, and the North Fork John Day Watershed Council in cooperation with landowners and other agencies and organizations for implementation of the Area Plan.

Goal

The goal of this Area Plan is to establish a framework to minimize agriculture's impact on water quality within the North and Middle Forks John Day River AgWQM Area. The Area Plan establishes procedures to identify and control factors that contribute to pollution originating on agricultural and rural lands. It also describes a program designed to achieve the goals of this Area Plan.

Objectives

1. Work to improve the quality of water in the AgWQM Area through planning and implementation of technically sound and economically feasible conservation practices that contribute to meeting plan goals.

    A. Control pollution caused by agricultural activities, as close to the source as possible, by controlling soil erosion, sediment and animal waste delivery to streams.
    B. Demonstrate a reduction in sources of pollution from agricultural and rural lands through monitoring and periodic surveys of stream reaches and associated lands.
    C. Implement conservation practices to improve irrigation water use and conveyance efficiency to reduce the potential of polluted return flows.
    D. Implement conservation practices to moderate water temperatures by stabilizing streambanks and increasing shading.
    E. Promote adaptive management, which encourages adjustments in management based on feedback from monitoring and changing environmental and economic conditions.

2. Create a high level of awareness and an understanding of water quality issues, among the agricultural community and rural public, in a manner that minimizes conflict and encourages cooperative efforts through education and technical assistance activities.

A. Incorporate implementation of the Area Plan as a priority element in the SWCD's Annual Work Plan and Long Range Plan with support from partner organizations.
B. Showcase successful practices and systems and conduct annual tours for landowners and media.
C. Recognize successful projects and practices through appropriate media and newsletters.
D. Promote cooperative on-the-ground projects to solve critical problems identified by landowners/operators and in cooperation with partner organizations.
E. Conduct educational programs to promote public awareness of water quality.
F. Evaluate current research and monitoring results and conduct such monitoring as may be necessary to better quantify current conditions and objectives contained in this plan in preparation for biannual plan reviews.

3. Encourage active participation by the agricultural community and rural public in the process of solving our water quality problems.

A. Provide assistance to landowners in development of conservation plans and the implementation of effective management practices adopted in those plans.
B. Review research and development needs with agriculture assistance agencies and consultants to promote the continued development, evaluation, and adoption of practices and technologies that enhance water quality in an efficient, effective and economic manner.
C. Annually identify water quality funding needs with agencies providing cost-share and technical assistance to agricultural operations to promote incentive and cost-share programs to assist implementation of plans and related practices.

4. Achieve plan goals and objectives by encouraging adequate funding and administration of the program to achieve systematic, long range planning and focusing of coordinated efforts on full-scale, watershed-based approaches, identifying needs, developing projects, actively seeking funding, and ensuring successful implementation of funded projects.

In addition to these voluntary strategies, regulatory measures are included as an implementation strategy. The ODA will use enforcement where appropriate and necessary to gain compliance with rules. Any enforcement action will be pursued only when reasonable attempts at a voluntary solution have failed. (See Resolution of Complaints and Enforcement Action sections)

Prevention and Control Measures

A landowner's or operator's responsibility under this Area Plan is to implement measures that prevent and control the sources of water pollution associated with agricultural and rural lands and activities. A landowner or operator is not responsible for conditions caused by other

landowners or for circumstances not within their reasonable control including unusual weather events.

The sections that follow describe more detailed information related to potential agricultural water quality concerns, provide definitions of commonly used terms, provide dates when rules are effective, and provide some exemptions to the rules.

Waste Management

A landowner or operator's responsibility under this Area Plan is to prevent the introduction of waste materials into nearby bodies of water. There are existing, applicable statutes and rules that regulate water quality.

Current Oregon Law, Oregon Revised Statute (ORS) 468B.025(1) states that:
"...no person shall:

> (a) Cause pollution of any waters of the state or place or cause to be placed any wastes in a location where such wastes are likely to escape or be carried into the waters of the state by any means.
>
> (b) Discharge any wastes into the waters of the state if the discharge reduces the quality of such waters below the water quality standards established by rule for such waters by the Environmental Quality Commission."

ORS 468B.050 identifies the conditions when a permit is required. A permit is required for certain livestock confinement areas, defined as animal feeding operations or concentrated animal feeding operations (AFO/CAFO), which are consistent with the federal definitions.

Definitions (ORS 468B.005)

> "Wastes" means sewage, industrial wastes, and all other liquid, gaseous, solid, radioactive or other substances which will or may cause pollution or tend to cause pollution of any waters of the state. Additionally, OAR 603-095-0010(53) includes but is not limited to commercial fertilizers, soil amendments, composts, animal wastes, vegetative materials, or any other wastes.
>
> "Pollution or water pollution" means such alteration of the physical, chemical, or biological properties of any waters of the state, including change in temperature, taste, color, turbidity, silt or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the state, which will or tends to, either by itself or in connection with any other substance, create a public nuisance or which will or tends to render such waters harmful, detrimental or injurious to public health, safety or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses or to livestock, wildlife, fish or other aquatic life or the habitat thereof.

"Water or the waters of the state" include lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters which do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction.

Upland Management

A landowner or operator's responsibility under this Area Plan is to implement measures that prevent and control water pollution from agricultural activities and soil erosion. This includes agricultural and rural lands that may not be in close proximity to waterbodies but have the potential to contribute to water quality degradation.

Upland areas are the rangelands, forests and croplands, upslope from the riparian areas. These areas extend to the ridge tops of watersheds. With a protective cover of grass (herbs), shrubs or trees, consistent with site capability, these areas will capture, store and safely release precipitation thereby reducing the potential of excessive soil erosion or delivery of soil or pollutants to the receiving stream or other body of water. Proper management of upland vegetation considers physical and biological conditions of the management area, controls soil erosion and minimizes transport of soil and nutrients to the stream. Upland management also simultaneously considers livestock production interests and protection of fish and wildlife habitat.

Vegetation and soils are distinguishing characteristics of upland areas. Adequate vegetative cover can prevent or reduce soil erosion, minimize pollutant transport, improve water infiltration and storage, and protect fish and wildlife habitat. Vegetation is dependent on physical characteristics including soil, geology, landform, water and other climate factors. In a healthy upland environment, management will provide a balance of these characteristics.

Upland productivity varies depending on the characteristics listed above as well as biological and management factors. This productivity supports a wide variety of wildlife and forage for livestock. Healthy uplands maintain productivity over time and are resilient to stresses caused by variations in physical conditions such as climatic changes.

To implement proper management practices and ensure an area is healthy or functioning properly, the capability and potential of a site must be understood. Capability is the highest ecological status a site can attain given political, social, or economic constraints or limiting factors. Potential is the highest ecological status a site can attain given no political, social, or economic constraints and is often referred to as the "potential natural community". Examples of constraints would include local ordinances, location of roads or homes, and the costs of management changes.

- Healthy upland areas provide several important ecological functions. These include:
- Capture, storage and safe release of precipitation.
- Provide for plant health and diversity that support habitat (cover and forage) for wildlife and livestock.
- Filtration of sediment.
- Filtration of polluted runoff.
- Provide for plant growth that increases root mass that utilizes nutrients and stabilizes soil against erosion.

Indicators of these conditions include:

- Recruitment of beneficial plant species.
- Ground cover to limit runoff of nutrients and sediment
- Cropland cover that is sufficient to limit movement of nutrients and sediment.
- Roads and related structures designed, constructed and maintained to limit sediment delivery to streams.
- Noxious weed and insect pest populations contained (see State weed laws and county weed control regulations to determine weed species that must be controlled).

Factors to evaluate upland area condition may include:

- Vegetation utilization through stubble height measurements
- Plant species composition to measure plant health and diversity
- Ground cover (live plants, standing plant litter and ground litter) as a measure of potential erosion
- Evidence of overland flow (pattern and quantity)
- Site productivity (domestic livestock and wildlife carrying capacity)
- Soil erosion potential through prediction models available through NRCS.

Upland management addresses a water quality parameter of concern identified in the 303(d) list as sedimentation. This Area Plan does not prescribe specific practices to landowners for management of upland areas to reduce runoff of sediment and other wastes. Site specific recommendations for management to protect water quality, including grazing management systems, desirable vegetation types and road construction and maintenance, can be obtained from sources listed in the Implementation Strategies section of this Area Plan.

Riparian Area Management

A landowner or operator's responsibility under this Area Plan is to implement measures that prevent and control water pollution from agricultural activities. Areas near waterbodies are especially important to water quality and sensitive to management activities.

The riparian area, as defined in OAR 141-110-0020(28), is a zone of transition from an aquatic to a terrestrial system, dependent upon surface or subsurface water, that reveals through the

zone's existing or potential soil-vegetation complex the influence of such surface or subsurface water. A riparian area may be located adjacent to a lake, reservoir, estuary, pothole, spring, bog, wet meadow, muskeg, slough, or ephemeral, intermittent or perennial stream.

Water is the distinguishing characteristic of riparian areas but soil, vegetation and landform also exert strong influence on these systems. In a healthy riparian ecosystem, these four components interact to produce a wide variety of conditions.

Healthy riparian areas provide several important ecological functions. These include:

- Dissipation of stream energy associated with high flows and thus influencing the transport of sediment.
- Capturing suspended sediment and bedload that builds streambanks and develops floodplain function
- Retaining floodwater and recharging ground water
- Stabilizing streambanks through plant root mass
- Developing diverse channel characteristics providing pool depth, cover, and variations in water velocity necessary for fish production
- Supporting biodiversity
- Shade for moderation of solar heat input
- Recruitment of large woody debris for aquatic habitat

Indicators to determine improvement of this condition include:

- Recruitment of desirable riparian plant species
- Maintenance of established beneficial vegetation
- Maintenance or recruitment of woody vegetation -- both trees and shrubs
- Streambank integrity capable of withstanding 25-year flood events

Factors used to evaluate improvement of the riparian area condition could include:

- Expansion of riparian area as evidenced by development of riparian vegetation and plant vigor
- Reduction in actively eroding streambank length beyond that expected of a dynamic stream system
- Community composition changes reflecting an upward trend in riparian condition (Increases in grass-sedge-rush, shrubs, and litter and decreases in bare ground)
- Plant community composition reflecting an upward trend as indicated by decreases in noxious plant species
- Stream channel characteristics show upward trend consistent with landscape position (i.e. a decrease of width to depth ratio of the channel)
- Shade patterns consistent with site capability
- Stubble height of herbaceous species and leader growth of shrubs and trees

Riparian area management addresses the water quality parameters of concern, some of which, are identified in the 303(d) list. Streamside vegetation influences water temperature through

shade, stream width-to-depth ratio, groundwater recharge and discharge, and other hydrological factors. Sediment reductions improve fish and invertebrate habitat. Healthy riparian conditions improve biological criteria and habitat by reducing stream disturbances, preventing excessive heat and contaminant inputs, and adding to stream habitat complexity.

Riparian area health may be directly influenced by management. This Area Plan does not prescribe specific practices to landowners for management of riparian areas. Site specific recommendations for management to protect water quality, including buffer width, vegetation types, and grazing timing, can be obtained from sources listed in the Implementation Strategies section of this Area Plan.

Grant County government has recognized, as a part of the comprehensive land use planning process, the value of riparian management along rivers, streams and springs. The natural features provided by riparian areas have extensive economic, social, and environmental benefits to the county residents. The goals of this Area Plan are generally consistent with the natural resource elements of the Grant County Comprehensive Land Use Plan regarding water quality and riparian vegetation. Coordination of county and state programs addressing riparian condition may be provided by the local SWCDs.

Irrigated Lands Management

A landowner or operator's responsibility under this Area Plan is to implement measures that prevent and control water pollution from agricultural activities. Diversion of water for irrigation or other uses and the return of that water to the stream are activities that have potential for contributing to water quality problems.

Irrigated lands are lands either riparian, floodplain or uplands upon which water is applied for the purpose of growing crops. Diversion of water from a waterbody to be applied on land for the purpose of growing crops is a recognized beneficial use of water. Irrigation water use is regulated by the Oregon WRD in the form of water rights, which specify the rate and amount of water that can be applied to a particular parcel of land. Refer to WRD Rules (OAR 690-300-0010(26)) for more details.

Irrigation in this basin is done by either flooding or sprinkler application. Water usually is diverted from a surface source (stream or pond) but may also be from groundwater sources. Irrigation management in this basin recognizes there may be some positive benefits occurring from flood irrigation application - including flow augmentation as water returns back to the stream, cooling and filtering of water through underground percolation, and the recharge of shallow wells and springs due to the connectivity of surface water to groundwater sources. Irrigation water may be used more than once as it returns to the stream and is available for instream uses or by other irrigators. Ultimately, streamflows will be enhanced by upland and riparian management practices promoting natural upstream storage and properly functioning floodplains that catch, store, and safely release precipitation for beneficial uses during summer months. Characteristics of an irrigation system that has minimal effect on water quality include:

- Delivery of water efficiently to the land within legal water rights
- Minimal overland return flows
- Return flow routing that provides for settling, filtering and infiltration
- Minimal effect on stability of streambanks and minimal soil erosion
- Scheduling of water application appropriate to the site including consideration of soil conditions, crop needs, climate and topography
- Installation and management of diversion structures to control erosion and sediment delivery, and protect the stability of streambanks. If funding becomes available, temporary diversions, which must be reinstalled every year, should be replaced with suitable permanent diversions (i.e. pumping stations, infiltration galleries, dams)
- Diversions that are adequately screened and which provide for fish passage. Refer to ORS 498.268

Livestock Management

A landowner or operator's responsibility under this Area Plan is to implement measures that prevent and control water pollution from livestock operations. Livestock production is the most common agricultural activity in the management area. Careful management of areas used for grazing, feeding and handling is critical to the success of livestock operations and have potential to affect water quality.

Livestock management can be done in a manner that limits soil erosion and minimizes the delivery of sediment and animal wastes to nearby streams. A grazing management system should promote and maintain adequate vegetative cover, for protection of water quality, by consideration of intensity, frequency, duration and season of grazing.

Grazing near streams should be managed to prevent negative impacts to streambank stability, allow for recovery of plants, and leave adequate vegetative cover to ensure protection of riparian functions including shade and habitat. Offstream watering systems, upland water developments, feed, salt and mineral placement are examples of methods to be considered as ways to reduce impacts of livestock to streamside areas.

Factors used to evaluate effectiveness of management may include:

- Safe diversion of runoff
- Protection of clean water sources
- Off stream watering systems
- Lot maintenance; smoothing, mounding, seeding
- Structural measures i.e.; filter strips, catch basins, berms
- Waste collection, storage and application methods

Implementation Strategies

The following guidelines will apply for public participation in implementation and review of the Area Plan. The department and the SWCD intend to encourage participation in this water quality improvement program by:

- Providing educational programs to raise public awareness and understanding of water quality issues and solutions.
- Providing incentives for the development and implementation of Voluntary Water Quality Plans.
- Offering technical assistance for the development and implementation of effective agricultural management practices for pollution control.
- Developing a monitoring program to identify current and potential water quality problems.
- Following up on any water quality complaints and provide assistance in solving identified problems

Authority for any enforcement action rests with the ODA under provisions in OAR 603-090-0060 through 603-090-0120.

Educational Programs

As resources allow, the SWCDs, watershed councils, and OSU Extension Service (Extension), in partnership with other agencies and local organizations, will develop educational programs to improve the awareness and understanding of water quality and quantity issues. The objective of the educational program is to promote the programs in a manner that reduces conflict and encourages cooperative efforts through education and technical assistance activities by:

- Incorporating implementation of the Area Plan as a priority element in the Monument, Grant, and Umatilla County SWCDs' Annual Work Plan and Long Range Plan with support from partner organizations.
- Showcasing successful practices and systems and conduct annual tours for landowners and media.
- Recognizing successful projects and practices through appropriate media and newsletters.
- Promoting cooperative on-the-ground projects to solve critical problems identified by landowners and in cooperation with partner organizations
- Conducting educational outreach to promote public awareness of water quality issues coordinating the review of information and education materials with agencies or organizations as appropriate.

Voluntary Water Quality Plans

Landowners and operators have flexibility in choosing management approaches and practices to address water quality issues on their lands. They may implement management systems on their own without a plan or may develop a plan that suits the needs of their operation. The local management agencies recommend that voluntary water quality plans be developed to assist the landowners and operators to assess the conditions on their lands, identify problems or potential problems and to describe measures and resources needed to address those problems. Voluntary water quality plans describe the management systems and schedule of conservation practices that the landowner will use to conserve soil, water, and related plant and animal resources on all or part of a farm or ranch unit. Voluntary water quality plans may be developed by private landowners and operators, hired consultants, or technicians available through the SWCD or the US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). An effective individual water quality plan will outline specific measures necessary to prevent or control water pollution and soil erosion from agricultural activities and to address the "Prevention and Control Measures" outlined in this AgWQM Area Plan.

Farm planning assistance is available from these and other sources:

- Technical Assistance

  NRCS -- planning, design, implementation.
  SWCD –- planning, design, implementation, grant-writing.
  Watershed councils –- planning, implementation, grant-writing.

- Workbooks and Publications

  Voluntary Conservation On Your Land, NRCS/Oregon Association of Conservation Districts (OACD)
  Oregon Small Acreages Conservation Toolbox, NRCS/OACD
  WESt Program Workbook, Oregon Cattleman's Assoc. (OCA)/OSU
  Ranch Water Quality Planning Workbook, OSU Extension
  The Oregon Plan Toolbox, OWEB

- Programs

  Farm*A *Syst Program, OSU Extension
  Stream*A *Syst Program, OSU Extension
  Home*A *Syst Program, OSU Extension

Technical & Financial Assistance

It is not the intent of this Area Plan to impose a financial hardship on any individual. It is the responsibility of the landowner or operator to request technical and/or financial assistance and to develop a reasonable timeframe for addressing potential water quality problems.

As resources allow, the Monument, Grant and Umatilla County SWCDs, USDA-NRCS, the North Fork John Day Watershed Council, and other natural resource agency staff are available to assist landowners in evaluating effective practices for reducing runoff and soil erosion on their farms, where it exists, and incorporating these practices into voluntary individual water quality plans. Personnel in these offices can also design and assist with implementation of practices, and assist in identifying sources of cost-sharing funds for the construction and/or use of some of these practices.

Technical and cost-sharing assistance for installation of certain management practices may be available through current USDA conservation programs such as Environmental Quality Incentive Program (EQIP), Conservation Reserve Enhancement Program (CREP), Continuous Conservation Reserve Program (CRP), EPA's non-point source implementation grants (Section 319), or state programs such as Oregon Watershed Enhancement Board (OWEB). Other agencies may also be available to provide technical assistance or financial assistance to private landowners.

Water Quality Management Practices

Effective agricultural management practices for pollution control, are those management practices and structural measures that are determined to be the most effective, practical means of controlling and preventing pollution from agricultural activities.

Appropriate management practices for individual farms may vary with the specific cropping, topographical, environmental, and economic conditions existing at a given site. Due to these variables, it is not possible to recommend any uniform set of management practices to improve water quality relative to agricultural practices.

Management practices and land management changes are most effective when selected and installed as integral parts of a comprehensive resource management plan based on natural resource inventories and assessment of management practices. The result is a system using the management practices and land management changes which are designed to be complementary, and when used in combination are more technically sound than each practice separately.

A detailed listing of a number of specific practices and management measures which can be employed to control or reduce the risk of agricultural pollution are contained in other documents such as the Field Office Technical Guide, available for reference at the local NRCS office.

Monitoring and Evaluation

The progress and success of implementation efforts will be assessed through determination of changes in land management systems and the measurement of water quality improvement over time. Monitoring activities are integral components of the Area Plan. For the purposes of this Area Plan, four main types of monitoring are described below. These are:

1. Baseline condition monitoring

   Baseline condition monitoring provides a starting point for assessing water quality trends and for future evaluation of the effectiveness of water quality improvement efforts. Baseline condition monitoring typically includes identification and analysis of data previously and currently collected in the area according to accepted protocols.

2. Water quality trend monitoring

   Water quality trend monitoring can help to track how water quality (typically on a watershed or sub-watershed scale) is changing over time, including after implementation of an AgWQM Area Plan. It is recommended that trend monitoring follow recommendations in the Oregon Plan Water Quality Monitoring Technical Guide. This guide book describes accepted procedures and protocols for most activities that would be used to conduct baseline condition and trend monitoring on a watershed scale, including development of quality assurance/quality control plans to assure quality of data and protocols for data collection.

3. Effectiveness monitoring

   a) Evaluate the effectiveness of specific management practices in reducing losses or loadings of components such as sediment or nutrients. The NRCS has a good amount of information about the effectiveness of various practices in protecting surface water and groundwater quality.

   b) Evaluate the net effect of the implementation of an AgWQM Area Plan and watershed improvement activities on water quality trends.

4. Compliance monitoring

   Conducted as a part of a compliance investigation, this type of monitoring is specific to individual sites. Site-specific information and data are collected to characterize and quantify the physical setting and land management conditions that relate to a potential rule or standards violation. Photographic documentation of the suspected problem is typically also included in the assessment. Water samples may be taken for chemical or biological analysis.

When used effectively, monitoring activities can provide valuable information on how much effect a plan is having, how extensively it is being implemented, and where more efforts are needed in a basin.

Biennial Review

This Area Plan and the associated Area Rules are subject to a two-year review process. Two years after adoption, ODA, in cooperation with the Monument SWCD and the LAC will assess the progress of Area Plan implementation toward achievement of Area Plan goals and objectives. These assessments will include:

1. An accounting of the numbers and acreage of operations with Voluntary Water Quality Plans and the calculated amount of soil erosion and pollution prevented.

2. Identification of additional sources of sediment, heat inputs and other contributors to non-attainment of all applicable water quality standards.

3. An evaluation of available current water quality monitoring data.

4. An evaluation of outreach and education programs designed to provide public awareness and understanding of water quality issues.

5. A review of projects, demonstrations, and tours used to showcase successful management practices and systems.

6. An evaluation of the effectiveness of technical and financial assistance sources available to the agricultural community.

7. Review of load allocations (LA) and effectiveness of this plan in meeting LAs as described in the TMDL for the John Day Basin.

Based on these assessments, the ODA, SWCD, LAC, and the State Board of Agriculture will consider making appropriate modifications to the Area Plan and Rules. Any future amendments to the Area Rules will be subject to public participation process as defined in Oregon law.

Resolution of Complaints and Enforcement Action

ODA will investigate complaints against landowners or operators who are alleged to be out of compliance with the Rules associated with this Area Plan. If the landowner is in non-compliance, ODA will consult with the landowner/operator and the SWCD using the Field Office Technical Guide to develop solutions and timelines. The authority and procedures for complaint investigation rests with the ODA under provisions of OAR 603-095-1060.

ODA will use enforcement mechanisms where appropriate and necessary to gain compliance with the prevention and control measures. Any enforcement action will be pursued only when reasonable attempts at voluntary solutions have failed. Landowners with chronic or egregious violations of Area Rules will be subject to enforcement action by ODA under authority provided in OAR 603-090-0060 through 603-090-0120.

Entry onto private property is authorized for the purpose of investigating lands within the Management Area to determine sources of pollution. ODA may investigate lands within the Management Area to determine those actions that may be required of landowners under the Area Rules and to determine whether the landowner is carrying out the required actions. ODA will not enter onto private lands without first seeking landowner consent.

ADMINISTRATIVE ROLES AND RESPONSIBILITIES

Designated Management Agency

The Oregon Department of Agriculture is the Designated Management Agency for water pollution control activities on agricultural and rural lands in the North and Middle Forks John Day River Water Quality Management Area. The department is authorized to develop and carry out a water quality management plan for any agricultural or rural lands where such a plan is required by state or federal law.

Monument SWCD is the Local Management Agency (LMA) designated by the department for development and implementation of the AgWQM Area Plan and projects in the AgWQM Area. Grant and Umatilla County SWCDs will assume responsibility for the implementation of the Area Plan and related projects within those districts under agreement with the LMA. The North Fork John Day Watershed Council will assist the LMA in implementation and review of the Area Plan and related projects. Implementation priorities will be established on a periodic basis through annual work plans developed jointly by the SWCD and ODA with input from partner agencies.

The director of ODA appointed a LAC representing local agricultural producers, and owners, agencies, tribes, environmental organizations and the SWCD for the purpose of assisting with the development of this Area Plan and the associated OARs to implement core elements of the Area Plan.

The LMA and LAC will participate in biennial review of plan implementation progress. Any future amendments to the administrative rules will be subject to the public participation process outlined in Oregon law.

Total Maximum Daily Loads

The Oregon DEQ is required by federal law to establish formal "Total Maximum Daily Loads" (TMDLs) for pollutants in waters designated as "water quality limited." The TMDL development process will begin in this area in 2003. The TMDL will set maximum limits on the

amount of pollutants allowed to enter in the Management Area waters. This loading capacity is calculated to achieve water quality standards.

Each jurisdiction in the John Day River basin will be allotted a portion of the TMDLs, representing the maximum amount of pollutant, which may be discharged daily from the lands managed by the respective jurisdiction to the John Day River's waters. This amount is the jurisdiction's "Load Allocation" (LA). The DEQ has requested the appropriate Designated Management Agencies in the basin to develop pollution control plans and programs designed to achieve the LAs. OARs Chapter 340, Division 41, paragraph 026, 120 and 642 requires these Water Quality Management Plans and sets the water quality standards.

Consistent with this Area Plan and the memorandum of understanding between DEQ and ODA, an objective of this plan is to meet John Day basin LAs. At the time of publication of this Area Plan, these loads are not available. Assessments done in neighboring basins (Umatilla and Grande Ronde) indicate that system potential vegetation will be needed to sufficiently reduce stream temperatures. The periodic two year review for this Area Plan will enable modifications as needed to implement management that reduces pollutants related to LAs.

ATTACHMENT 1: 1998 Water Quality Limited Streams-303(d) List

Middle Fork Subbasin

NAME	SEGEMENT	PARAMATER
Big Boulder Creek	Mouth to Badger Creek	Temperature
Big Creek	Mouth to Headwaters	Temperature
Camp Creek	Mouth to Headwaters	Temperature
Caribou Creek	Mouth to Headwaters	Temperature
Clear Creek	Mouth to Headwaters	Temperature
Clear Creek, Dry Fork	Mouth to Headwaters	Temperature
Coyote Creek	Mouth to Headwaters	Temperature
Crawford Creek	Mouth to RM 3	Temperature
Davis Creek	Mouth to RM	Temperature
Granite Boulder Creek	Mouth to Headwaters	Temperature
John Day River, Middle Fork	Mouth to Crawford Creek	Flow Modification Temperature
Little Boulder Creek	Mouth to RM 2	Temperature
Little Butte Creek, East Fork	Mouth to Headwaters	Temperature
Little Butte Creek, West Fork	Mouth to Headwaters	Temperature
Long Creek	Mouth to Headwaters	Temperature
Lunch Creek	Mouth to Headwaters	Temperature
Mill Creek	Mouth to Headwaters	Temperature
Mosquito Creek	Mouth to Headwaters	Temperature
Placer Gulch	Mouth to Headwaters	Temperature
Ragged Creek	Mouth to Headwaters	Temperature
Squaw Creek	Mouth to Headwaters	Temperature
Summit Creek	Mouth to North Fork	Temperature
Vinegar Creek	Mouth to Blue Gulch	Temperature

North Fork Subbasin

NAME	SEGEMENT	PARAMATER
Alder Creek	Mouth to Headwaters	Habitat Modification Sedimentation
Bacon Creek	Mouth to Headwaters	Habitat Modification
Baldy Creek	Mouth to Headwaters	Habitat Modification Sedimentation Temperature
Bear Creek	Mouth to Headwaters	Habitat Modification
Bear Wallow Creek	Mouth to Headwaters	Habitat Modification Temperature
Beaver Creek	Mouth to Headwaters	Temperature
Beaver Creek, South Fork	Mouth to Headwaters	Habitat Modification
Big Creek	Mouth to Headwaters	Temperature
Big Wall Creek	Mouth to Headwaters	Habitat Modification Sedimentation Temperature
Boulder Creek	Mouth to FSR 7355	Habitat Modification
Bowman Creek	Mouth to Headwaters	Habitat Modification Temperature
Bridge Creek	Mouth to Headwaters	Temperature
Bull Creek	Mouth to Headwaters	Habitat Modification
Bull Run Creek	Mouth to Headwaters	Habitat Modification Sedimentation Temperature
Cable Creek	Mouth to Headwaters	Habitat Modification Temperature
Camas Creek	Mouth to Headwaters	Habitat Modification Temperature
Clear Creek	Mouth to Wilderness Boundary	Temperature
Corral Creek	Mouth to Headwaters	Habitat Modification
Cottonwood Creek	Mouth to Headwaters	Biological Criteria
Cottonwood Creek, East Fork	Mouth to Headwaters	Biological Criteria
Crane Creek	Mouth to FSR 7340	Habitat Modification Temperature
Crawfish Creek	Mouth to Headwaters	Habitat Modification Temperature
Davis Creek	Mouth to Headwaters	Habitat Modification
Deep Creek	Mouth to Headwaters	Habitat Modification
Desolation Creek	Mouth to N/S Fork Conf.	Temperature
Ditch Creek	Mouth to Smith Ditch	Temperature
Fivemile Creek	Mouth to Headwaters	Habitat Modification Temperature
Fox Creek	Mouth to Headwaters	Temperature

NAME	SEGEMENT	PARAMATER
Frazier Creek	Mouth to Headwaters	Habitat Modification Temperature
Granite Creek	Mouth to Headwaters Mouth to China Gulch China Gulch to Headwaters	Habitat Modification Temperature Sedimentation
Hidaway Creek	Mouth to Headwaters	Habitat Modification Temperature
Hog Creek	Mouth to Headwaters	Sedimentation
Indian Creek	Mouth to Headwaters	Habitat Modification Temperature
John Day River, North Fork	Mouth to Middle Fork Middle Fork to Granite Ck Granite Ck to Wilderness	Temperature Temperature Habitat Modification Temperature
Lane Creek	Mouth to Headwaters	Temperature
Mallory Creek	Mouth to Headwaters	Temperature
Olive Creek	Mouth to Headwaters	Habitat Modification
Onion Creek	Mouth to Headwaters	Temperature
Owens Creek	Mouth to Headwaters	Habitat Modification Temperature
Porter Creek	Mouth to Headwaters	Habitat Modification Sedimentation
Potamus Creek	Mouth to Headwaters	Temperature
Rancheria Creek	Mouth to Headwaters	Temperature
Rudio Creek	Mouth to Gilmore Creek	Temperature
Skookum Creek	Mouth to Headwaters	Habitat Modification Temperature
Stadler Creek	Mouth to Headwaters	Temperature
Swale Creek	Mouth to Headwaters	Habitat Modification Sedimentation Temperature
Taylor Creek	Mouth to Headwaters	Habitat Modification Temperature
Trail Creek	Mouth to Headwaters	Habitat Modification Temperature
Trail Creek, North	Mouth to Headwaters	Habitat Modification
Train Creek, South	Mouth to Headwaters	Habitat Modification Temperature
Wilson Creek	Mouth to Headwaters Mouth to Bull Prairie Lake	Habitat Modification Sedimentation Temperature

ATTACHMENT 2: References to information used in the development of the Area Plan

Agricultural Commodity Sales - Grant County, Extension Economic Information Office, OSU, January 1999

Effective Cattle Management in Riparian Zones: A Field Survey and Literature Review, Montana BLM, 1997.

Influences of Human Activity on Stream Temperatures and Existence of Cold-Water Fish in Streams with Elevated Temperature: Report of a Workshop, Interagency Multidisciplinary Science Team, November 8, 2000.

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John Day River Basin Report, Oregon Water Resources Dept., November 1986

John Day River Management Plan and Environmental Impact Statement, BLM & OSPRD, October 1993

NRCS Field Office Technical Guide, NRCS

OARs, Chapter 340, Division 41, DEQ, March 1996

OARs, Chapter 603, Divisions 90 and 95, ODA

Oregon Final 1998 Water Quality Limited Streams - 303(d) List, DEQ, Nov. 1998

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Oregon Revised Statutes, 561.191

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Oregon Small Acreages Conservation Toolbox, NRCS /OACD, 1999

Questions and Answers About DEQ's Temperature Standards, DEQ, February 1998

Ranch Water Quality Planning Workbook, OSU Extension,

Relationship Between Agriculture Water Quality Management Area Plan Conditions and Water Quality Standards, ODA, Sept. 2000

Restoring Water Quality Throughout Oregon, DEQ, February 1998

Riparian Area Management; A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas, BLM/USFS/NRCS, 1998

Riparian Area Management; Process for Assessing Proper Functioning Condition, BLM, 1995

Riparian Area Responses to Changes in Management, BLM/OSU, 1999

Stream Restoration Program for the Middle Fork Subbasin of the John Day River, Oregon Water Resources Dept., May 1991

Stream Restoration Program for the North Fork Subbasin of the John Day River, Oregon Water Resources Dept., November 1993

Successful Strategies for Grazing Cattle in Riparian Zones, Montana BLM, 1998

The Ecological Provinces of Oregon, Oregon Agricultural Experiment Station, May 1998

The Oregon Plan Toolbox, Oregon Watershed Enhancement Board

Water Quality Monitoring: Technical Guide Book, OWEB, July 1999

WESt Program Workbook, Oregon Cattleman's Association, 1998

ATTACHMENT 3: North/Middle Forks John Day River Map